Abstract

The study investigates the impacts of official development assistance (ODA) on the inflows of foreign direct investment (FDI) in 64 provinces of Vietnam in 2002–2004. These impacts are examined using both the two-stage least squares method and the fixed effects/random effects model. The regression results give evidence of the positive impacts of ODA in infrastructure on FDI inflows, not only by direct channels, but also by indirect channels through improving the human capital base of respective provinces. However, the short term impacts of the current level of ODA disbursement are ambiguous. Robust evidence only proves the long-term impacts of ODA in infrastructure on FDI attraction. At the donor level, we found that Japanese ODA has a positive and significant impact on the allocation of the FDI of Japanese private investors in both the short-run and long-run.

I. INTRODUCTION

To achieve a sustainable economic development target, the major issue for developing countries is to attain an adequate foreign financial source to escape from the vicious circle of low savings and low economic growth. Developing countries usually start their economic development at a low level of income per capita and, thus, low levels of domestic savings. According to Hayami and Godo (2006): "For such developing countries, in which the investment needs for development tend to exceed domestic saving capacities, net capital import from abroad represents a possible escape from the vicious circle of slow economic growth and low savings" (pp.45-46). Therefore, in developing countries, of which financial sectors are yet to be well developed, foreign direct investment (FDI) and official development assistance (ODA) not only represent the major source of finance, but also provide a chance for human capital accumulation and technology transfer in recipient countries.

FDI, compared to ODA, is preferable due to its characteristics of political independence. The determinants of FDI have become a major source of recent economic studies to unveil the reasons why some regions are more successful than others in attracting FDI. So far, many empirical studies have identified various factors that can affect the inflow of FDI including the level of development, market size and policy, and infrastructure, of which infrastructure is considered the key element to improve the investment environment for promoting FDI.

Countries with high levels of infrastructure investment like Japan, Korea and later China and Vietnam, have experienced a high and sustainable economic growth. In these countries, infrastructure and its related services reduce the transaction costs, raise competitiveness, support productivity and efficiency in manufacturing and distribution, and

create a sustainable domestic market while linking them to the international market. To further attract FDI, the challenge now is to find ways to finance infrastructure. Infrastructure, due to its specificity of high capital intensity and long life cycle tends to be prone to market failures. Therefore, investment in infrastructure usually relies heavily on public finance. In developing countries with low levels of domestic saving as mentioned above, ODA represents the main source of finance.

In the literature, many studies have focused on figuring out the relationship among FDI, infrastructure, ODA, and economic development. While most studies find a positive relationship between infrastructure and FDI inflow and between FDI and economic growth, studies on the relationship between ODA in infrastructure and FDI attraction is still lacking[1]. According to the World Bank (2006), this is probably due to the fact that in most developing countries, ODA in infrastructure does not contribute significantly to the total funds for infrastructure investment. In fact, ODA in developing countries, is usually not an important source of financing infrastructure investment in low- and middle-income countries of East Asia. However, it is not the case in Vietnam.

Over the past decade, Vietnam has achieved spectacular continuous GDP growth with an annual per capita growth rate averaging 7.3%, the eighth highest in the world, from 1992 to 2002. A critical part of this success is contributed by the high level of FDI. In fact, FDI has contributed as much as 14% of the total Gross Domestic Product (GDP) of Vietnam and 54% of its total exports (Freeman, 2002). Among various factors, the high level of infrastructure investment, which has been mainly financed by ODA, has been considered to contribute significantly to attract FDI to Vietnam. The importance of ODA in funding infrastructure has been recognized widely in the 5-year plan and 10-year socio-economic strategy by the

[1] The studies include Glickman and Woodward, 1988; Hill and Munday, 1991, 1992; Wheeler and Mody, 1992; Lorre and Guisinger, 1995.

Vietnamese government. In the Socio-economic Development Strategy of 2006–2010, the Vietnamese government has specified the target of future annual infrastructure investment summing up to 11.4% of the GDP, i.e., an increase of 2% of the GDP over the recent levels.

In order to meet the government's infrastructure goals, this financing gap will need to be filled with an increase in ODA in infrastructure. The key issue for recent discussion is to find a positive relationship between increasing ODA in infrastructure and improving the FDI inflow. However, so far, there is no empirical study about the linkage between ODA in infrastructure and FDI inflow in Vietnam. This linkage, once proved, can not only affect largely the governmental policies toward mobilizing and utilizing this important fund for development, but also can provide a strong argument for persuading donors to invest in infrastructure projects.

To provide more evidence on the debate about the importance and the role of ODA in infrastructure and FDI in Vietnam, this paper focuses on analyzing the impacts of ODA in infrastructure as one of the most important determinants of FDI inflow. This paper aims to explore the interrelationship between ODA in infrastructure and FDI inflow. More specifically, this paper can produce a new perspective on the discussion of the impacts of foreign aid on FDI promotion to persuade donors in infrastructure projects.

This paper is divided into 6 main sections. Section II contains definitions of important terms and the linkages among them. Section III review the past studies on the targeted issue. Section IV describes the overall picture of ODA and FDI in Vietnam and the proposed hypothesizes. Section V summarizes the econometric model with expected results. Section VI shows the regression results. Finally, Section VI presents the conclusion and policy implications.

II. CONCEPTUAL FRAMEWORK

1. Definition of terms

1.1. Foreign aid

According to the Glossary of Statistical Terms of the Organization for Economic Co-operation and Development (OECD), ODA refers to "the flow of official financing administered with the promotion of economic development and welfare of developing countries as the main objective, and which are concessional in character with a grant element of at least 25 percent (using a fixed 10 percent rate of discount). By convention, ODA flows comprise contributions of donor government agencies, at all levels, to developing countries ("bilateral ODA") and of multilateral institutions. ODA receipts comprise disbursements by bilateral donors and multilateral institutions".

1.2. Infrastructure

According to the definition in investorworld.com, "Infrastructure is the basic physical systems of a country's or community's population, including roads, utilities, water, sewage, etc"[2]. These systems have been considered significant in improving the dynamic development of economies. Infrastructure in this study is limited to transport, electricity and telecommunications and water supply because these services are capital-intensive and tend to exhibit substantial economies of scale. Moreover, the features of infrastructure services including space and use specificity, long-lasting life time and lumpiness make it typical type of a public good. With the characteristics of a public good, including non-excludability and non-rivalness and, more importantly the phenomenon of free-riding, infrastructure services

[2] http://www.investorwords.com/2464/infrastructure.html

suffer from market failures, which make it difficult to allocate appropriate privatevfinancial sources for infrastructure investment. According to World Bank (2006, pp. 10-15), "In some infrastructure sectors, there are activities in which private sector financing can help unlock resources. However, in most cases, private sector interest is likely to be limited and private sector participation is more difficult to structure". In these situations, official financing plays an important role in unlocking a country's own resources to meet infrastructure challenges. Official funds, especially ODA, may play a significant role in financing large–scale infrastructure projects. This is particularly important because through ODA, the government can also encourage private sector initiation so as to maximize national and international welfare.

1.3. FDI

According to the Government of Vietnam (1999), "FDI is defined as a long-term investment by a foreign direct investor in an enterprise resident in an economy other than where the foreign direct investor is based".

2. The linkage between ODA and FDI

Infrastructure affects FDI inflow in both direct and indirect ways (Figure 1). Infrastructure in transport systems provides better conditions for foreign investors to access their markets of both outputs and inputs. The establishment of other crucial facilities including electricity, water, and gas allows mass production of output. In addition, workers involved in infrastructure construction have chances to increase their income and, in turn, raise the aggregate disposal income and consumption, which eventually increases market size and potential sales of investors. Also, better access to schools and hospitals and the increase

in income have positive effects in human capital formulation, which in turn, supplies a highly qualified labor force for the investors.

III. REVIEW OF PAST STUDIES

In the literature, much effort has been spent on investigating the relationship between infrastructure and investment, focusing mainly on FDI. These studies can be divided into three categories: (1) the effects of infrastructure on investment and economic growth; (2) the effects of foreign aid on investment and aggregate growth; (3) the determinants of FDI such as political stability, development indicators, market size, and economic growth.

3.1. The effects of infrastructure on investment and economic growth

According to Estache (2004), there are 102 studies that have examined the impacts of infrastructure on growth, investment, and productivity. The majority finding is the positive impact of infrastructure on economic growth and investment. In the case of developing countries, many studies have confirmed the significant impact on aggregate output of the development of telecommunications and roads[3]. In particular, Canning and Bennathan (1999) estimated the social rates of return to electricity and paved roads, relative to the returns to general capital. They found that both types of infrastructure are highly complementary with the other physical and human capital, especially in a few countries, where there is evidence of acute shortages of electricity and paved roads. Thus, there are excess returns to infrastructure investment. While infrastructure is important, Devarajan, Swarroop and Zhou (1996), ironically, found a negative relationship between the share of infrastructure expenditures in total public expenditure.

Prud'homme (2004) found that most of these studies, which follow the production function-based approach, suffer from a number of drawbacks. Firstly, many infrastructure

[3] The studies include studies of Roller and Waveman, 2001; Demetriades and Mamuneas, 2000; Canning and Bennathan, 1999; Fernald, 1999.

investment decisions are not based solely on the consideration of maximizing economic growth but much weight is taken on the political and social aspects. Secondly, measuring the infrastructure stock is difficult, both conceptually and empirically, because what affects investment are infrastructure services, while the available information is related to infrastructure supply. Thirdly, the efficiency with which infrastructure services is supplied depends on the regulatory framework governing service provision.

2. The effects of foreign aid on investment and aggregate growth

Doucouliagos and Paldam (2005) report that there are 43 papers containing accumulated estimates of the impacts of aid on savings. Aid is found to have a positive impact on savings and investment and, thus, savings and investment promote aggregate economic growth. Also, Sturm (2001) found that foreign aid has made a statistically significant contribution to public investment, which in turn contributes to economic growth. However, studies such as Hansen and Tarp (2000) and Harms et al. (2004) conclude that foreign aid may depress domestic savings.

3. The determinants of FDI

Edward Crenshaw (1991) found in a number of studies the positive effects of the level of development, market size and economic growth on FDI[4]. On the other hand, Bennett and Green (1972) and Schneider and Frey (1985) found a negative relationship between political instability and FDI.

Harms and Lutz (2006) and Karakaplan et al. (2005) examine directly the relation between foreign aid and FDI using data from developing countries. Harms and Lutz (2006)

[4] These studies include study of Dunning (1981), Bollen and Jones (1982), and Scheneider and Frey (1985).

found two major effects of ODA on FDI flows: (1) ODA improves infrastructure system of recipient countries and, thus, enhances the marginal product of capital in the recipient countries; (2) ODA encourages rent-seeking behavior, which leads to a decrease in the factor productivity in the country and may discourage FDI inflows. The effects of aid on FDI is generally insignificant but significantly positive for countries in which private agents face heavy regulatory burdens. Karakaplan et al. (2005) also found an insignificant effect of aid on FDI, but in contrast to the finding of Harms and Lutz (2006), their results suggested that good governance and developed financial markets lead to a positive effect of aid.

IV. FDI AND ODA IN VIETNAM: AN OVERVIEW

Since the start of economic reforms in Vietnam in 1986 up until 2006, FDI inflow in Vietnam has increased considerably. In 2005, Vietnam attracted US$5.8 billion of FDI. Apart from the shock to the world or regional economy such as the Asian financial crisis, the number of registered FDI projects has increased strikingly (Figure 2) (in the first 11 months of 2007, the amount of FDI has achieved 15.03 bil USD). We can also notice a similar trend in the level of ODA disbursement. In 2005, the donor community has commited the amount of 3,74 bil.USD to Vietnam (the commitment reached 4.45 bil USD in 2007) . ODA resources have mostly been allocated in accordance with the priority of the Government. Infrastructure has been the largest beneficiary of ODA: 22.6 per cent of the source was allocated to transport, 20.3 percent to electricity generation and transmission and another 8.3 per cent to water supply, drainage and urban infrastructure (Ministry of Planning and Investment, 2003). Interestingly, the distribution of ODA among provinces of Vietnam is not biased toward the poor areas of the country (Table 1). Regions with low poverty rates such as Red River Delta

and South East received much more aid than other poor regions. This can be explained by the higher efficiency of development spending, mainly through encouraging FDI in relatively more developed areas in generating economic growth. Therefore, a large amount of ODA was allocated to the relatively prosperous urban centers rather than to the rural and mountainous areas, where the poverty concentration is high.

To see more clearly the trend of correlation between FDI and ODA, let have a look in Red River Delta and the South East region, which are ahead of the rest of the country in terms of the amount of FDI they attract. These regions also have the nation's highest number of new FDI enterprise registrations per capita and are also recorded to be regions with highest amount of ODA commitment and disbursement. In particular, provinces with a high concentration of ODA including Hochiminh City, Hanoi, Dongnai, Binhduong, and Baria-Vungtau have attracted large inflows of FDI (Figure 3). Since their local economies continue to be reinforced by large ODA inflows, we can expect to find a strong correlation between FDI inflow and ODA in infrastructure in the provinces of Vietnam.

On the basis of current situation of Vietnam, the null hypothesises are:

- H_0 : **ODA in infrastructure has no positive impact on FDI**

  H_1 **: ODA in infrastructure has positive impact on FDI**

- H_0 **: ODA in infrastructure of one donor has no positive and strong impact on FDI from that particular country.**

  H_1 **: ODA in infrastructure of one donor has positive and stronger impact on FDI from that particular country**

V. ECONOMETRIC MODEL

We use the two stage least squares (2SLS) and the fixed effects/random effects (FE/RE) model in the estimation.

1. The 2SLS

In the first stage of 2SLS, the ODA in infrastructure is regressed on a set of exogenous variables including 2 instrumental variables that affect ODA, but do not affect the FDI. In the second stage, the predicted values of ODA enter as one of the regressors of the FDI.

There are two reasons why the 2SLS is justifiable. Firstly, infrastructure, which is mainly financed by ODA, acts as a prerequisite for the establishment of FDI projects. ODA is also considered an endogenous variable in the FDI regression and instrumental variables are needed to correct for endogeneity using two-stage estimation procedure. Secondly, the error term in the FDI regression contains unobserved province-specific effects so that the error term may be correlated with the variations in some of the regressors. For example, shocks in the Gross Domestic Product Per Capita (GDPPC) may be highly correlated with the shocks that affect FDI. The tests for endogeneity, the test for over-identification, and the test for strength of instruments are conducted to ensure the robustness of the coefficients, of which the results are all in favor of 2SLS.

In both stages, all variables are transferred into logarithm form to minimize the excessive variations in the value of ODA and FDI. Also, as some provinces are recorded to have zero values, those observations are excluded when they are transferred into logarithm form and hence reduce the number of observations for the regression analysis. In order to avoid this problem, a small value of 0.001 is added to each observation when they are being transformed into logarithm form (Pham Hoang Mai, 2005).

The first equation in the 2SLS is

Eq. (1) lnODA = f(lnlagODA, $\ln ODAhat \times \ln SCHOOL$, lnINDUS, lnSCHOOL, lnGDPPC, lnPOP, lnTAX, , D_{year03}, $D_{yeear04}$, lnPATIENTBED, $D_{Moutainous}$).

The endogenous variable ODA is measured by the current disbursement value of ODA in infrastructure from all donors. This represents the direct, short-term impact of ODA on the attraction of FDI. ODA is measured in real domestic currency, deflated by the CPI using 2000 as the base year and converted into US dollar (US$) using the official exchange rate of the respective year. In this paper, ODA values include ODA in roads, telephones and other telecommunication, water supply and electricity, which come from the report of Development Assistance Database (DAD) project of the Ministry of Planning and Investment.[5]

Two instrumental variables are included to correct for the endogeneity of ODA. The first instrumental variable is the number of patient beds per person in local hospitals (PATIENTBED), which represents the level of basic public service in that province. The data of this variable come from Ministry of Labor and Social Affairs. The second instrumental variable is the dummy for mountainous province ($D_{Moutainous}$), which takes the value of unity, if the province is mountainous, and zero, if otherwise.

The second-stage equation of the 2SLS is

Eq. (2) lnFDI = f(lnODAhat, lnlagODA, $\ln ODAhat \times \ln SCHOOL$, lnINDUS, lnSCHOOL, lnGDPPC, lnPOP, lnTAX, , D_{year03}, $D_{yeear04}$).

[5] For this study, foreign aid data are measured in gross which is yet to subtract the repayment from the government to loan aid. The gross value is justifiable because this paper analyzes the effects of ODA at provincial level, which does not relate closely to repayment at the national level.

Since there are no strong reasons to assume any functional forms other than a linear relationship, a simple linear regression analysis is applied. The structural regression equation follows the model used by Kimura and Todo (2007).

The dependent variable is measured by the registration value of FDI in the provinces. The commitment value, rather than disbursement value, is an appropriate proxy because this study focuses on the influence of ODA in infrastructure and the improvement of FDI inflow. The data of registered FDI come from the data of provincial committed FDI flows for the 2002-2004 period, which are collected by the Foreign Investment Agency of the Ministry of Planning and Investment.

The variable lnODAhat represents the short-term impact of ODA in infrastructure on FDI, whereas the variable lnlagODA represents the long-term impact. The indirect effect of ODA on FDI is captured by the interaction term between ODA and the secondary school enrollment ($\ln ODAhat \times \ln SCHOOL$). The variable lnINDUS represents the area of industrial and export-processing zones, where basic infrastructure for FDI projects is provided.

One motivation of foreign investors to invest in developing countries is the availability of a cheap and well-educated labor force. The variable lnSCHOOL is used as a proxy for the quality of local labor force, which represents the potential productivity in each province. The income per capita of each province ($\ln GDPPC$) is used as a proxy for the level of wage rate in Vietnam, which represents the cost of labor in Vietnamese provinces.

The effects of provincial market size are represented by the population of the province (lnPOP). Population has been considered a proxy for market size and many studies have proved the statistically significant positive effects of population on FDI flows in both national

and regional levels, for both developed and developing countries (Lecraw 1991; Wheeler and Mody 1992).

To examine the impacts of governmental policies on FDI inflow, we include the taxratio variable (lnTAX), which represents the favorable policies of government towards mountainous provinces. The variable is calculated by the average tax ratio, based on the ratio of turnover tax and profit tax over total turnover of FDI projects. The larger the ratio, the less favorable the governmental policy toward the province.

The year dummies for 2003 and 2004 are included to assess any secular increase in FDI compared to 2002 (the base year).

2. The FE/RE model

The FE/RE model is appropriate because there are unobserved factors that affect local FDI attraction, the values of which are constant across time and cannot totally be covered in the ordinary least squares (OLS) model. In this case, the OLS regression may suffer from the omitted variables problem which causes the coefficients to be inconsistent and biased. In order to correct for biases arising from omitted variables and the possible correlation between the error term and explanatory variables, we employ the FE/RE method to correct for the correlation between the error term and the independent variable. The superiority of the FE/RE model is evaluated based on the result of Hausman test.

The FE/RE equation is:

Eq. (3) lnFDI = f(lnODAhat, lnlagODA, $\ln ODAhat \times \ln SCHOOL$, lnSCHOOL, lnGDPPC, lnPOP, lnTAX, , a_i).

The FE/RE effects model includes all the exogenous variables in the second-stage equation of the 2SLS model, except for the variable lnINDUS, the value of which is constant throughout the period of 2002-2004. All time-invariant factors are captured by a_i .

3. Expected sign of the coefficients

We expect lnODA and lnlagODA to assume positive signs because the level of infrastructure is a critical determinant of FDI inflow. The coefficient of the variable $\ln ODAhat \times \ln SCHOOL$ is expected to have a positive sign to prove the positive indirect effect of ODA on FDI by enhancing human capital resources. The area of industrial and export-processing zones (lnINDUS), which reflects the level of infrastructure development, is also expected to have a positive coefficient. LnSCHOOL is expected to have a positive coefficient, which implies that the higher rate of secondary school enrollment attracts more FDI. Workers who completed secondary school are likely to understand new technology more easily and be able to better participate in industrial production.

The expected sign of the coefficient of lnGDPPC is ambiguous. GDPPC represents the prevailing wage rates in the provinces so that the higher the GDPPC, the lower the FDI. On the other hand, GDPPC represents consumption demand and, thus, a higher GDPPC means a higher potential sale for the firms. The variable lnPOP, which is a proxy for the potential market size, is expected to have a positive coefficient. Provinces with larger population size are expected to attract more FDI.

Government tax incentives in mountainous and remote areas and in areas with difficult natural, economic and social conditions are expected to promote FDI inflow. The Foreign Direct Investment Law of Vietnam set two encouraging tax levels, i.e., 10% and 15%, instead of the normal 28%. The coefficient of the variable lnTAX is expected to have a negative sign, i.e., the smaller the tax ratio the higher the FDI inflow. The dummy variable 2003 and 2004 is expected to have positive sign to indicate a secular rise in the FDI vis a vis 2002 (control).

VI . REGRESSION RESULTS

The results of the first stage regression are summarized in Table 2. As expected, the level of ODA disbursement is positively affected by the level of disbursement in the previous year. More specially, a 1% increase in the previous-year disbursement leads to about a 1% increase in the level of current disbursement, which is statistically significant at 1%. ODA in infrastructure is negatively correlated with the number of patient beds in provincial hospitals, implying that aid allocation is influenced by the level of development of public service in that province. Provinces receiving less public service will receive more attention and more aid from donors. However, the dummy variable ($D_{Moutainous}$) has minor positive coefficient (nearly 0), implying that there is minor bias of aid allocation towards mountainous provinces. In other words, ODA in infrastructure in Vietnam is not significantly higher in provinces with special difficulty. In addition, GDPPC, also does not have a significant impact on the level of ODA in infrastructure. GDPPC is the proxy of the level of living in the provinces. This implies that ODA in infrastructure does not necessarily flow to poor provinces.

The results of the second stage regression are summarized in Table 3. The effect of the total stock of current ODA in infrastructure on FDI flow is positive but insignificant in the 2SLS model. This suggests that the total direct short-term effects of foreign aid on FDI are not substantial. However, after controlling for provincial fixed effects, we find in the FE model that the effect of current aid in infrastructure positively affects the FDI inflow. In particular, a 1% increase in ODA in infrastructure leads to a 4% increase in FDI inflow. This is consistent with the expectation that ODA in infrastructure enhances the attraction of FDI. In other words, infrastructure depends, to a large extent, on the specific characteristics of each

province. These results imply that there is evidence of the direct, short-term impact of ODA in FDI inflows.

The positive coefficients of lnlagODA in infrastructure are statistically significant both in the 2SLS model and the FE model. This proves the direct, long-term impact of ODA in infrastructure on FDI inflows, which can be explained by the specific characteristics of long lifetime cycle of infrastructure.

In the 2SLS model, the coefficient of the interaction term between ODA in infrastructure and secondary school enrollment ($\ln ODAhat \times \ln SCHOOL$) is significant, which means that ODA, through increasing the secondary school enrollment rate, has positively contributed to the attraction of FDI. This suggests that ODA in infrastructure enhances FDI inflow through indirect channels by improving the human capital in the provinces.

In the FE model, the coefficient of the interaction term is, however, not significant, suggesting that the indirect impact of ODA in infrastructure on FDI attraction is not robust. The area of industrial zones also has a significant impact on FDI inflows with the coefficient being statistically significant in the 2SLS model. The number of pupils enrolled at secondary schools has a positive and significant coefficient both in the two stage least squares model and the FE model. The magnitudes of the coefficients in both model are comparatively large, implying that the quality of labor force of each province has played a decisive role in attracting FDI flows.

The positive correlation of GDPPC to FDI inflows implies that FDI does not flow to provinces with low income per capita or low average wage rate. Rather, it supports the argument that GDPPC, which represents the potential market size of the province, has a positive impact on the FDI inflow, i.e., the higher the income, the larger the local market; and

hence, the more attractive the province is to FDI flows. This also proves that the quality, rather than the cost of labor, matters in the decision of foreign investors in FDI allocation.

The only variable which has the opposite sign with the expectation (negative sign instead of positive) is population. For the 2SLS model, the coefficient is statistically significant at 1% but it is insignificant in the FE model. This reveals that the impact of population on FDI inflows is ambiguous. Apart from Hanoi and Hochiminh city, where the high density of population is associated with the higher level of income and expenditure, other big-population provinces are mainly characterized with larger geographical areas, but low levels of expenditure on consumption goods. Therefore, population does not appropriately represent the purchasing power or the potential market size of the provinces.

Tax ratio has a statistically significant, positive correlation with FDI inflows in the 2SLS model but has no statistically significant impact on the FDI inflows in the FE model. This result may imply that the government tax incentives have not been effective in attracting FDI inflows in mountainous or remote provinces. From 2002 to 2004, provinces such as Quang Tri province in Central Coast, Kon Tum province in Central Highlands, and Bac Kan province in Northern Uplands, which are among poorest provinces in Vietnam, received no FDI projects and very few ODA in infrastructure projects.

Now, we examine the disbursement value of ODA in infrastructure in Japan and European Union (EU), the two major bilateral donors in Vietnam. Japan has been by far the largest donor in Vietnam since the resumption of aid to Vietnam in 1992. During the 1994-2005, Japan has committed JPY 1.4 trillion of which JPY 965 billion is in the form of soft loans with the main area of investment in infrastructure projects such as national road, trade ports, and large-scale power plants.

We apply the similar techniques of 2SLS and FE/RE model to explore the determinants of FDI in the two countries. In the case of Japan, the Hausman test (Pro>chi2= = 21.05%) shows that RE is superior to FE so that we report the results of the RE model. Our results indicate that ODA from Japan has a positive and significant effect on the inflow of Japanese FDI, but this does not hold true in the case of EU (Table 4). It might be because Japanese ODA is allocated mainly for infrastructure development: the proportion of ODA in infrastructure investment accounts for 85% of the total Japanese ODA (Ministry of Planning and Investment, 2006). The transportation sector and power industry account for the largest chunk of Japanese ODA, which comprise 38% and 29% of the total ODA, respectively. And, according to CONCETTI (2002), there is a high tendency for Japanese investors to invest in provinces which received much ODA in infrastructure.

In the case of EU, the major factors that affect FDI are secondary school enrollment and the area of industrial zones. This implies that ODA in infrastructure attracts FDI through its indirect effect on human capital accumulation and the presence of complementary industrial zones. Overall, our results show that the major distinct feature of Japanese ODA is its emphasis on infrastructure development, which, in turn, significantly attracts FDI to the provinces of Vietnam.

VII. CONCLUSIONS AND POLICY IMPLICATIONS

Our results provide evidence that ODA in infrastructure has contributed to the attraction of FDI in the provinces of Vietnam, not only by direct channels through the current ODA disbursement, but also by indirect channels through improving the human capital base of the respective provinces. The impact of ODA in infrastructure on FDI inflow is ambiguous

because of the specific characteristics of infrastructure such as use specificity, long gestation period, and lumpiness.

Our results also show an unequal allocation of FDI across provinces, which can be attributed to differences in the infrastructure development, quality of labor force, and size of the local market. Provinces with a higher level of infrastructure development, higher quality of labor force, and larger local market tend to attract a significantly larger amount of FDI. Japanese ODA on infrastructure has a positive and significant impact on Japanese FDI but this does not hold true in the case of EU. Japanese ODA is heavily biased toward infrastructure development.

This study has three policy implications. First, the Vietnamese government should adjust its priority policy in ODA mobilization towards attracting more ODA in infrastructure particularly from the Japanese government. Second, in order to increase the relevance and efficiency of infrastructure projects, the government should establish a concrete socio-economic strategic development plan geared towards increasing returns to infrastructure development. Finally, the government should focus on strengthening secondary school and vocational training programs, rather than providing tax incentive policies, because skilled human capital base is a major key for attracting FDI to Vietnam.

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Table 1

Regional Distribution of Official Development Assistance, 1993-2004

Regions	*Poverty Rate in 2002*	*Per capita ODA (US$) Average in 1993-2004*
North West	68	120
North East	38	117
Red River Delta	22	130
Hanoi[1]	5	440
Central Coast	39	128
Central Highlands	52	82
South East	11	157
Hochiminh City[2]	2	274
Mekong Delta	23	50

[1] Hanoi is located in Red River delta but is cited separately because the ODA level in this province is much higher than the average level in the region.

[2] Hochiminh City is located in South East but is cited separately for the same reason.

Source: World Bank, Ministry of Planning and Investment (MPI), Ministry of Labor, Invalids and Social Affairs (MOLISA) and Government Statistics Office (GSO), 2003.

Table 2

Determinant of Official Development Assistance in Infrastructure
The First Stage in Two Stage Least Squares Model

Variables	*Name of the variables*	*Coefficients (2SLS)*	
		Coef.	*t-value*
Lag of ODA in infrastructure	lnlagODA	0.68**	3.75
lnSchool*lnODAhat	$\ln ODAhat \times \ln SCHOOL$	0.45**	4.01
Area of industry zones	LnINDUS	0.02	1.69
Secondary school enrollment	lnSCHOOL	-0.81	1.02
Income per capita	lnGDPPC	-1.14	-0.12
Population	lnPOP	2.15	0.89
Tax ratio	lnTAX	0.61	0.78
Year Dummy for 2003	D_{year03}	23.01	1.01
Year dummy for 2004	D_{year03}	21.67	1.23
Number of patient beds per person in hospitals of the province	PATIENTBED	-2.26**	-1.97
Dummy for mountainous province	$D_{Moutainous}$	0.08*	1.96
Constant term	Cons	-14.52*	-1.68
Adjusted R^2		0.87	
Number of observation		192	

* = statistically significant at 5% level.
** = statistically significant at 1%level.

Table 3

The Determinant of Foreign Direct Investment Inflows-The Structural Equation in Two Stage Least Squares Model

Variables	*Name of the variables*	*Two-stage Least Squares*		*Fixed Effects*	
		Coef.	t-value	Coef.	t-value
Predicted ODA	lnODAhat	1.36	1.48	2.04*	1.97
Lag of ODA in infrastructure	lnlagODA	0.85*	1.97	1.50**	2.12
lnSchool*lnODAhat	$\ln ODAhat \times \ln SCHOOL$	0.14*	1.99	0.135	0.81
Area of industry zones	lnINDUS	0.32	1.69		
Secondary school enrollment	LnSCHOOL	2.03**	2.42	3.36**	2.33
Income per capita	lnGDPPC	1.87*	1.96	1.26*	1.98
Population	lnPOP	-1.98**	-2.24	-1.86	-1.29
Tax ratio	lnTAX	-1.51**	3.00	0.87	0.02
Year Dummy for 2003	D_{year03}	2.91	0.93		
Year dummy for 2004	D_{year04}	1.29	0.19		
Constant term	Cons	-19.20	-0.54	-19.48	-0.59
Adjusted R^2		0.45		0.49	
Number of observations		192		192	

* = statistically significant at 5% level
** = statistically significant at 1%level.

Table 4.

The Regression Results For Japanese and European Union (EU) Official Development Assistance

Variables	*Name of the variables*	*Japan*				*EU*			
		2SLS		Random Effects		2SLS		Fixed Effects	
Foreign Direct Investment inflows	lnFDI	*Coef*	*t-value*	*Coef.*	*t-value*	*Coef. value*	*t-*	*Coef.*	*t-value*
Predicted ODA	lnODAhat	1.03 *	0.88	1.47**	2.52	1.30**	2.78	1.64	0.24
Lag of ODA in infrastructure	lnlagODA	2.00**	3.55	2.03**	2.03	0.68	1.60	0.21	0.96
lnSchool*lnODAhat	$\ln ODAhat \times \ln SCHOOL$	2.35**	1.90	3.31**	2.34	0.20**	2.92	0.06**	2.92
Area of industry zones	lnINDUS	0.69*	1.60	0.15	1.13	0.74**	3.27	0.92**	2.22
Secondary school enrollment	LnSCHOOL	1.63	0.56	2.73**	3.67	2.47**	2.35	2.47**	3.38
Income per capita	lnGDPPC	3.15**	2.30	3.45**	2.31	4.50	0.18	0.39	0.16
Population	lnPOP	0.063	0.42	0.024	0.77	-0.16	-1.28	0.20	0.91
Tax ratio	lnTAX	-4.32	-1.04	-4.24	-0.75	-4.28	-1.48	-3.51	-0.58
Year Dummy for 2003	D_{year03}	1.55	0.76						
Year dummy for 2004	D_{year04}	0.35	0.11			8.94	-3.04		
Constant term	Cons	1.39	0.07	1.91	0.09	-89.11	-1.66	25.13	0.83
Adjusted R^2		0.51		0.53		0.78		0.79	
Number of observation		192		192		128		128	

* = statistically significant at 5% level ** = statistically significant at 1%level.

Figure 1.

The Relationship Between Infrastructure and Foreign Direct Investment Inflows

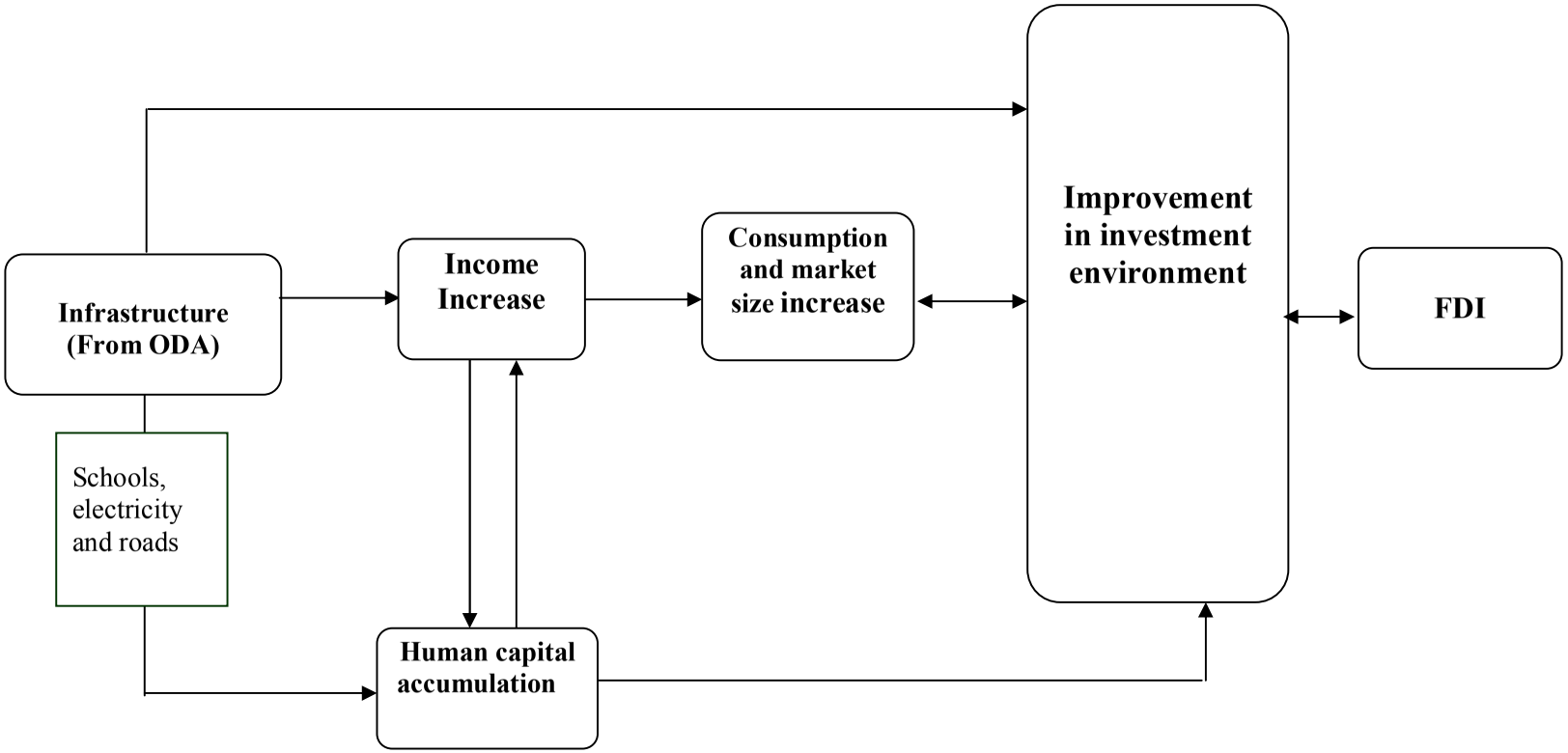
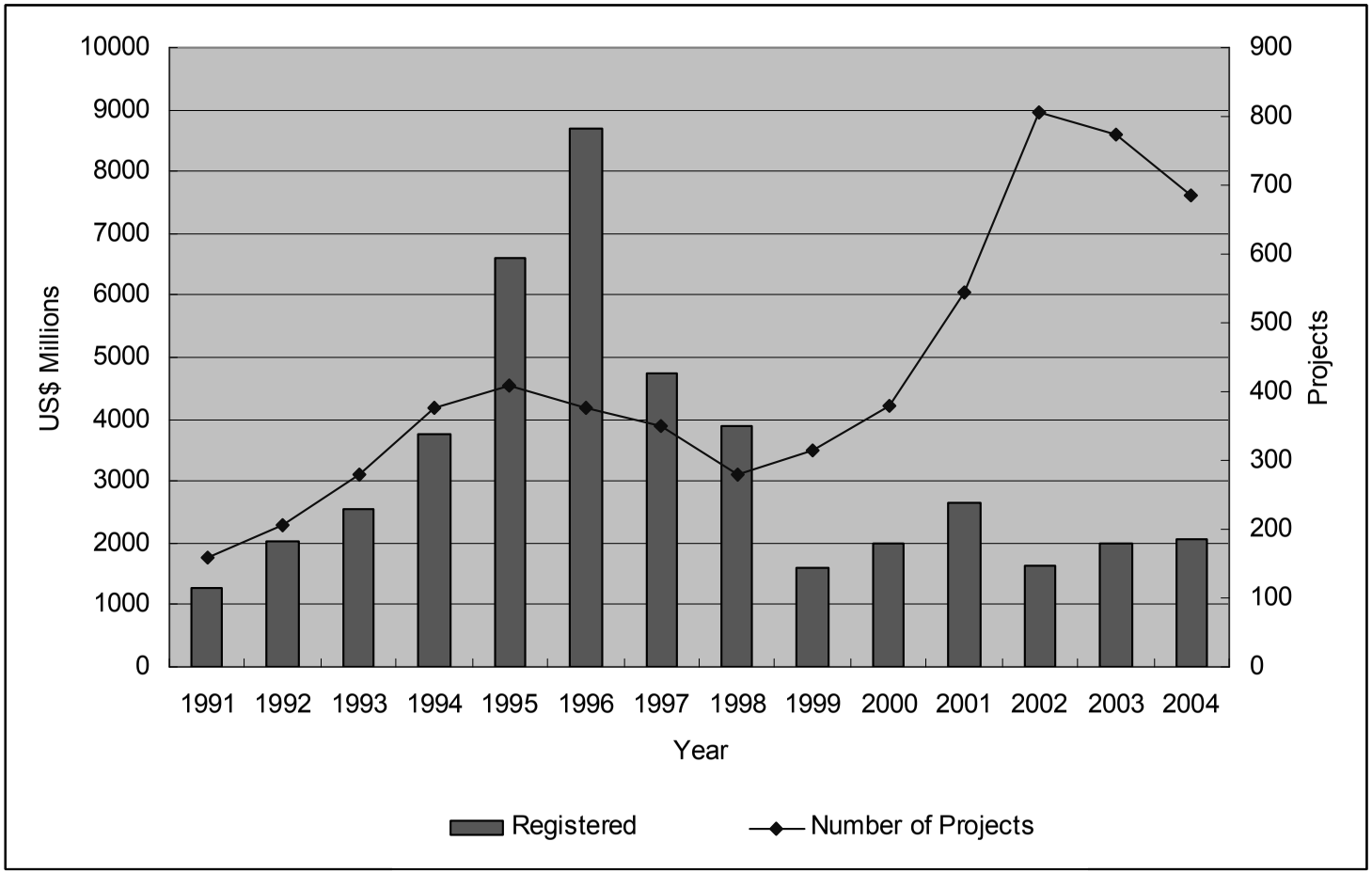


Figure 2

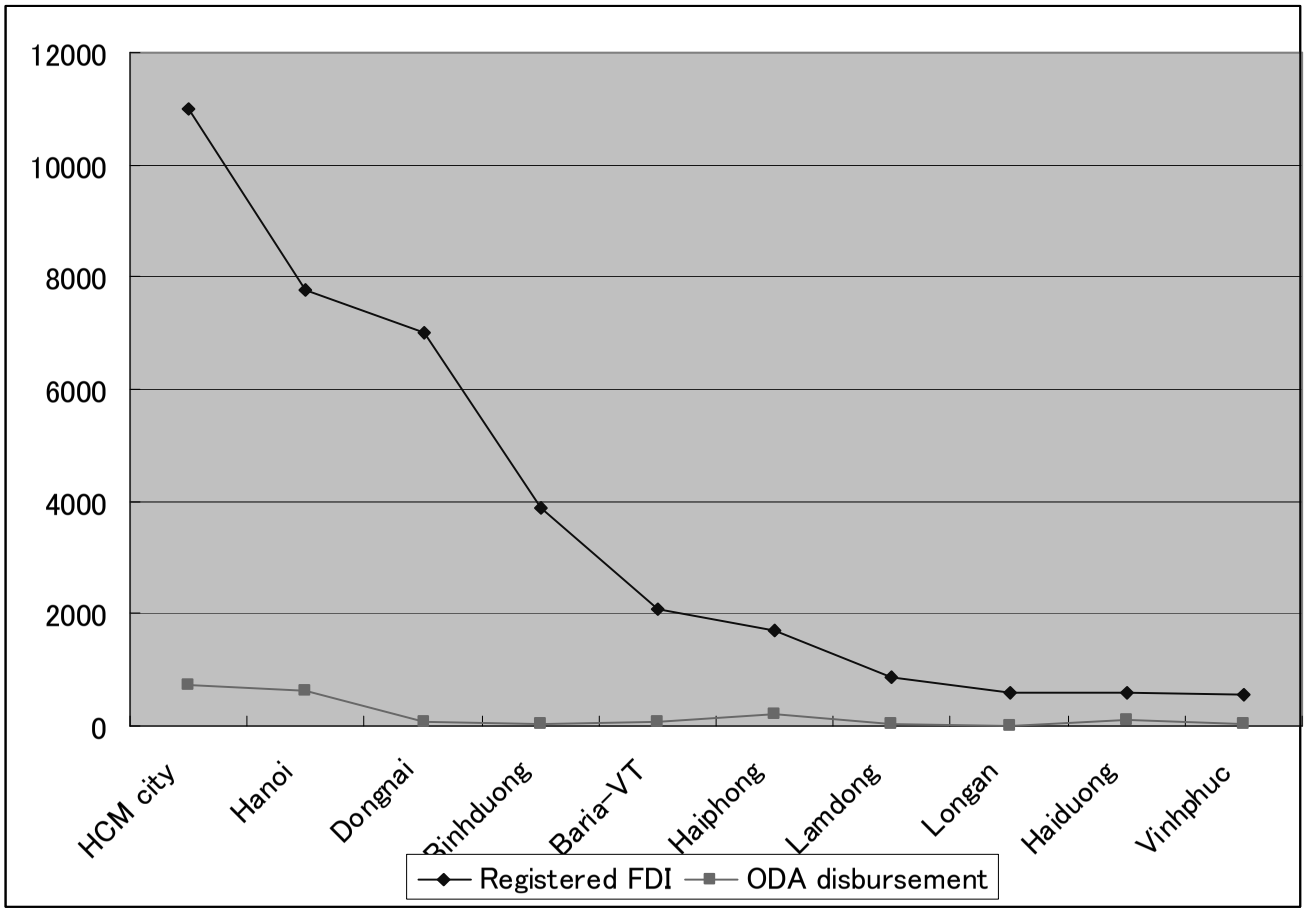
The Amount of Registered Foreign Direct Investment in Vietnam, 1991 – 2004



Source: Ministry of Planning of Investment.

Figure 3

Registered Foreign Direct Investment and Committed Official Development Assistance in Provinces of Vietnam, sum in 1988-2004.



Source: Ministry of Planning and Investment, 2004.